The contribution of long-range transport and secondary organic aerosol to $PM_{2.5}$ in Pittsburgh

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Summary

Design of effective control strategies to meet the new $PM_{2.5}$ standards requires an understanding of the origin of the $PM_{2.5}$. A major component of $PM_{2.5}$ in Pittsburgh is organic material. This results from both direct emissions from sources such as automobiles and trucks, and from formation of secondary organic aerosol in the atmosphere as oxidation products of organic gases. Data from the Pittsburgh Air Quality Study are used to examine the contribution of secondary organic aerosol to the total organic aerosol loading in the city. The data are also used to estimate the relative contribution of local and regional sources to $PM_{2.5}$ in this region. The contribution of secondary organic aerosol is estimated by using elemental carbon as a tracer for primary emissions of organic particulate matter. This approach indicates that between 20 and 40% of the organic particulate matter in Pittsburgh during the summer of 2001 is secondary in origin, which suggests that controls may be needed on gaseous precursor emissions in order to effectively control the contribution of organic aerosol to total $PM_{2.5}$. A comparison of data from monitoring sites outside Pittsburgh as well as data collected within the city is used to estimate the contribution of long-range transport and local sources to $PM_{2.5}$ in Pittsburgh.